

New
Specification



Rewarding Learning

General Certificate of Secondary Education
2012–2013

Double Award Science: Physics

Unit P1

Higher Tier

[GSD32]

WEDNESDAY 29 FEBRUARY 2012

9.30 am–10.30 am

**MARK
SCHEME**

1 (a) (i) At rest [1]	[1]	AVAILABLE MARKS
(ii) Bigger or steeper gradient [1]	[1]	
(b) Distance = 8(m)	[1]	
(c) Average Speed = Gradient [1]		
$= \frac{18}{12}$ [1]		
$= 1.5$ (m/s) [1]	[3]	
6		
2 (i) KE = $\frac{1}{2}mv^2$ [1]	[1]	
(ii) = $\frac{1}{2} \times 7500 \times 20^2$ [1]		
$= 1500000$ (J) [1]	[2]	
(iii) Work = 1500000 (J) [1] e.c.f. from (ii)	[1]	
(iv) Power = Work done/time [1]		
$= 1500000/20$ [1]		
$= 75000$ (W) [1]	[3]	
Allow e.c.f. from (ii) or (iii).		
(v) 75 (kW) allow e.c.f. from (iv) [1]	[1]	8
3 ● Two light nuclei [1]		
● Join together or combine or fuse [1]		
● To form a different nucleus [1]		
● Energy is released [1]		
● Decrease in mass [1]		
● High temperature [1]		

Response	Mark
Candidates must use appropriate specialist scientific terms throughout to describe fully and in a logical sequence the process of fission in a nuclear reactor using all the points shown in the indicative content above. They use good spelling, punctuation and grammar throughout and the form and style are of a high standard.	[5-6]
Candidates use some appropriate specialist scientific terms to partially describe, in a logical sequence, 3 or 4 points relating to nuclear fission shown in the indicative content above. They use satisfactory spelling, punctuation and grammar and the form and style are of satisfactory standard.	[3-4]
Candidates use limited specialist scientific terms to describe 1 or 2 of the points relating to fission shown in the indicative content above. Their spelling, punctuation, grammar, form and style are of a limited standard.	[1-2]
Response not worthy of credit.	[0]

6

			AVAILABLE MARKS	
4	(a)	1.2, 2.6 2 correct = [2], 1 correct = [1]	[2]	
	(b)	Scale > half of axis [1] Deduct [1] for each incorrect point within ± 1 square	[4]	} if non linear scale } then 0/4
	(c) (i)	Straight line [1], including origin [1] dependent marking ± 1 square	[2]	
	(ii)	Yes [1] Straight line through origin [1] allow e.c.f. from (c)(i)	[2]	10
5	(a) (i)	Increases [1]	[1]	
	(ii)	Decreases [1]	[1]	
	(b)	Direction (of vel.) changes/velocity is a vector [1]	[1]	
	(c)	$v = \frac{\text{mom}}{\text{mass}}$ or $\text{mom} = \text{mass} \times \text{velocity}$ or $p = mv$ [1] = 2.4/0.2 [1] = 12 (m/s) [1]	[3]	6
6	(i)	ACM = CM [1] or $F_1d_1 = F_2d_2$ $W \times 3[1] = 2400 \times 6.6 [1]$ $W = 5280 \text{ (N)} [1]$	[4]	4
7	(i)	$a = (v - u)/t [1]$ = 0.6/3 [1] = 0.2 (m/s ²) [1]	[3]	
	(ii)	$F = ma [1]$ $F = 200 \times 0.2 [1]$ allow e.c.f. from (i) $F = 40 \text{ (N)} [1]$	[3]	6
8	(i)	Nuclei (unstable) [1] Emit radiations (spontaneously) or disintegrates/decays [1]	[2]	
	(ii)	same number of protons [1] but different numbers of neutrons [1]	[2]	
	(iii)	0 [1] 8 [1] 6 [1]	[3]	
	(iv)	Fast moving electrons [1]	[1]	
	(v)	(High freq.) e.m. (radiation) [1]	[1]	9

			AVAILABLE MARKS
9	(a) Electrons dotted like currants [1], positive charge was to be spread throughout [1]	[2]	
	(b) (i) Electrons in orbit [1] or in shells		
	(ii) Nuclei were tiny [1] or small		
	(iii) Most mass is in the nucleus [1]	[3]	5
10	(a) It is the time taken [1] for the activity to decrease by half [1] (dependent marking) only gets access to activity mark if first mark given	[2]	
	(b) (i) 3 (half-lives) [1]		
	$\frac{1}{8}$ (th) [1]	[2]	
	(ii) Random (decay) [1]	[1]	
	(c) ${}_{88}^{232}\text{Th}$ for Thorium [1] ${}_{88}^{226}\text{Ra}$ for Ra [1] ${}_{2}^{4}\text{He}$ or ${}_{2}^{4}\alpha$ [3]	} all free-standing marks [5]	10
Total			70